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Research and Evaluation of Advanced Missile Component Technologies

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The Research, Development and Engineering Center (RDEC), U.S. Army Aviation and Missile Command (AMCOM) has the mission and function for investigating advanced missile components technology for weapon systems that should have positive impacts on the producibility, operations and support of future aviation and missile designs. During FY99 the RDEC is focusing on the technology areas of Electronic, Photonic, Electro-Optical and Electro-Magnetic Materials; Multispectral Sensors Modeling and Simulation; and Applications of Nanotechnology to Tactical Missile Systems. The Systems Engineering and Production Directorate, RDEC, AMCOM has the mission and function of evaluating new technologies and determining the impacts of same on the producibility and supportability of AMCOM missile systems. The UAH Systems Management and Production Laboratory was tasked to provide this engineering support and analytical capability.

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PREFACE

This technical report was prepared by the staff of the Research Institute, The University of Alabama in Huntsville. The purpose of this report is to provide documentation of the work performed and results obtained under Delivery Order 44 of AMCOM Contract No. DAAH01-98-D-R001. Mr. Gary Maddux was the principal investigator. Ms. Sherry Starling and Ms. Angie Cornelius served as lead technicians. Mr. Daron Holderfield, Systems Engineering and Production Directorate, Research, Development, and Engineering Center, U.S. Army Aviation & Missile Command, provided technical coordination. Mr. William Pittman, Missile Guidance Directorate, U.S. Army Aviation and Missile Command, provided technical expertise and insights in advanced missile component technologies.

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Prepared for: Commander
U.S. Army Aviation & Missile Command
Redstone Arsenal, AL 35898

I have reviewed this report, dated October 1999 and the report contains no classified information.

Gary A Maddux

Principal Investigator

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1.0 Introduction

The Research, Development and Engineering Center (RDEC), U.S. Army Aviation and Missile Command (AMCOM) has the mission and function for investigating advanced missile components technology for weapon systems that should have positive impacts on the producibility, operations and support of future aviation and missile designs. During FY99 the RDEC is focusing on the technology areas of Electronic, Photonic, Electro-Optical and Electro-Magnetic Materials; Muiltispectral Sensors Modeling and Simulation; and Applications of Nanotechnology to Tactical Missile Systems.

The Systems Engineering and Production Directorate, RDEC, AMCOM has the mission and function of evaluating new technologies and determining the impacts of same on the producibility and supportability of AMCOM missile systems. Contractor support was required to augment RDEC sponsored workshops to investigate emerging applications in these technology areas. The Systems Management and Production Laboratory at The University of Alabama in Huntsville (UAH) Research Institute (RI) was tasked to provide this engineering support and analytical capability.

2.0 Objective

The objective of this research task was to research and identify organizations and experts working within the above technology areas, facilitate interactions with the RDEC in the form of technical papers/briefings, and develop knowledge bases that could be disseminated throughout the DoD and incorporated in the appropriate weapon systems planning. UAH conducted research to identify and categorize these technologies based on the potential for DoD weapons applications and manufacturing technology maturity.

3.0 Statement of Work

The statement of work, as outlined in delivery order 44, was as follows:

UAH shall provide the personnel, resources, expertise and materials required to perform the following efforts:

3.1 UAH shall conduct independent research to complement AMCOM, RDEC sponsored technology workshops in the areas of Electronic, Photonic, Electro-Optical and Electro-Magnetic Materials; Multi-spectral Sensors Modeling and Simulation; and Applications of Nanotechnology to Tactical Missile Systems. The independent research shall provide documentation on specific technology applications with regard to viability for military systems requirements, and identify specific experts in each area.

3.2 UAH shall establish a database to represent each technology area and provide emerging component performance characteristics or manufacturing process details. Coordination with research and engineering principals shall be accomplished for workshop requirements planning and to improve the technical presentations. All data shall be requested in electronic format and transferred to the Government for appropriate distribution.

4.0 Description of Workshop

The work performed on this task led directly to ***Workshop on Hyperspectral/Multispectral Sensors Measurements Modeling and Simulation*** on September 7-9, 1999 at the Sparkman Center, Redstone Arsenal, Alabama. The objective of this workshop was to review research progress in hyperspectral / multispectral sensor measurements modeling and simulation including multispectral target and background scenes, calibration and validation processes, algorithm development and performance measures for potential technology insertion in current tactical and strategic weapon systems, as well as for new systems. A second objective was to identify research and development gaps in the technology that must be filled to achieve Army and DoD program objectives.

5.0 Conclusion and Recommendations

During the time frame allocated by the delivery order, members of the UAH Applied Research Program, with the cooperation of representatives from AMCOM SEPD and Missile Guidance, performed an analysis and evaluation of advanced missile component technologies that could be incorporated into weapon system design. Results of these efforts were presented at a locally held workshop. Detailed findings can be found in the proceedings of that workshop, which was compiled by UAH and delivered under separate cover.